5.0 FINDINGS

5.1 Past Waste Activity Review

The ICPP has routinely handled radioactive materials, as well as potentially hazardous chemicals. Although waste handling processes have changed since the ICPP first began operation, the necessity for safely handling radioactive materials was recognized before operations began.

Most wastes at the ICPP consist of radioactive materials which are collected, processed, concentrated, and stored. The waste process treats streams so that there is a clean stream suitable for release to the environment and a waste stream which is stored on site. All waste streams are routinely monitored for radioactive contamination.

Waste areas (units) identified during this study are divided into the following three groups:

1. Radioactive waste - contaminated only with radioactive material;

2. Mixed waste - contaminated both with radioactivity and hazardous materials, such as acids or other chemicals;

3. Chemical waste - contaminated only with hazardous materials and no radioactivity.

The waste units are described in detail in the following section. Units have been grouped together according to the type of waste discharged and the geographical areas at the ICPP.

5.2 Disposal Units

5.2.1 Radioactive. Units which received only radioactive material are described in this section. Units where the received material contained acidic solutions or potentially hazardous chemicals in addition to radioactivity are described in Section 5.2.2.

5.2.1.1 CPP Fuel Storage Basin Area. Fuel elements scheduled for reprocessing at the ICPP were, in the past, stored in the CPP-603 Fuel Storage Basin. Use of this basin is presently being phased out as the fuel is transferred to the new fuel storage basin. Fission products in the fuel stored in the basin sometimes migrate or leak into the basin water, thus contaminating the basin water. Throughout the time the basin has been in use, various methods have been used for cleanup and disposal of the fuel basin water. Waste releases associated with this area are described in the following paragraphs:

1. When the basin was first constructed, a filtration system (known as the BIF filter) was included. Basin water was recirculated continuously through the BIF filter which was coated with diatomaceous earth filter aid. The filter was backwashed periodically, and the backwash slurry of filter aid and water was pumped to a concrete settling vault (CPP-301) 5 ft by 5 ft and 23 ft deep. Supernate from the vault was drained to a dry well (CPP-303). In 1962, a horizontal settling basin (CPP-741) was constructed and effluent flowed to an open dry well (MAH-SFE-SW-048). Use of the concrete settling vault was discontinued at this time.

   Use of the horizontal settling basin was discontinued in 1966. Total activity discharged is estimated to be about 6 curies in 700,000 gal of water. Later use of the CPP-301 settling vault occurred, but the effluent was collected in a tank and sent to the Process Equipment Waste (PEW) evaporator for treatment rather than to the ground.

   Some cleanup of the CPP-301 contaminated filter aid deposits began in 1977, but contamination spread into the CPP-740 settling basin area. A dirt backfill was installed in the CPP-740 basin area to prevent further spread of contamination. Preliminary studies of the areas as part of an ongoing decontamination program, have been completed, and the BIF filter has been removed to the RWMC.

#2 2. A French drain west of CPP-603 was used in the 1960's to dispose of basin water. Nitrate and chloride concentrations in the basin were controlled by discharging water from the basin to the French drain and adding clean water to the basin. The discharged water was radiologically contaminated. The French drain was decommissioned late in the 1960's when the Graphite Fuel Storage Facility (GFSF) was constructed. The drain was removed, packaged and sent to the Radioactive Waste Management Complex (RWMC) at the INEL. Low-level contaminated dirt was either backfilled in place or buried near the dry fuel storage area. The site is now under the GFSF building and is inaccessible.

#3 3. A temporary contaminated equipment storage area existed southeast of the CPP-603 fuel storage area. This facility was located south of the railroad tracks and north and west of a existing perimeter road which curved around the area. The area was approximately 100 by 500 ft and was used to store old and abandoned equipment, most of which was radiologically contaminated. A trench through the area was used to store some of the more highly radiologically contaminated or classified material. The temporary contaminated equipment storage area was decommissioned in the late 1970's, and the buried material taken to the Radioactive Waste Management Complex (RWMC). Also, much of the contaminated soil was removed and sent to the RWMC. About 6 to 12 in. of clean soil and gravel was placed over the area. However, the extreme eastern area of this unit still contains some radioactive contamination; radiation readings average about 6mR/hr.

#4. 4. In May 1953, the soil around the settling tank was found to be contaminated. The contaminated soil was removed.

5. In September 1954, the ground surface near the settling basin was found to be contaminated. Apparently a valve on the line from the fuel storage basin to the settling basin developed a leak, and the settling basin filled and overflowed. The contaminated soil was removed to the RWMC.

6. In the 1960's, a trench was constructed east of the fuel storage basin to allow discharge of basin water for maintenance in the basin. About 300,000 gal of water containing 40 ppm chloride and 10^{-3} to 10^{-4} Ci/ml of activity was discharged to this trench. Contaminated soil was left in place.

7. In September 1972, steam condensing from the vent line of the basin waste collection tank contaminated a 15 by 25 ft area northwest of CPP-642. An estimated one curie of activity was released. The area downwind of the release was also contaminated over an area about 10 by 20 ft. The contaminated soil was removed and sent to the RWMC.

8. An underground carbon steel line from the basin water filter system failed in April 1973. Approximately 21,000 gal of water leaked to the soil. Contaminated soil was left in place.

9. Soil contaminated to a level of about 2 R/hr at contact was found near the northeast corner of the south basin in July 1975. The contamination apparently resulted when a sump overflowed. The surface soil was removed and sent to the RWMC. Some contamination may still be present in the area.

10. In December 1976, about 800 gal of water from the fuel storage basin drained onto the floor from a plastic pipeline break. Some of the water drained through the door and contaminated a small area of asphalt and soil. The area was decontaminated.

11. In February 1978, up to 500 gal of waste containing sludge and #11 basin water was released to the ground near the basin waste hold tank during basin cleanup activities. The contaminated soil was cleaned up. During the same cleanup activities quantities of water were released to the ground when some containers holding the sludge and water froze. Upon melting, waste was released to the ground. This waste also was cleaned up.

12. In May 1984, contaminated paint chips from a painted, concrete #12 equipment storage pad were found in the basin area. The pad had been painted to control radiation spread. The chips, pad, and any contaminated soil under and around the pad have been removed and sent to the RWMC.

5.2.1.2 Other ICPP Areas.

13. Waste Calcining Facility (WCF). In October 1976, the solid #13 transport system carrying calcine from the WCF to the calcine solid storage facility became plugged. During an attempt to clear the cyclone, the cyclone momentarily pressurized and released calcine to the environment. An area of about 300 ft^2 was contaminated. The release was estimated to consist of 230 mCi of Sr-90, 40 mCi of Ru-106, and 230 mCi of Cs-137. The area was decontaminated, and covered with a layer of clean soil.

14. From 1951 till 1982 a sewage treatment plant, located west of #14 CPP-664, served most of the buildings present at the ICPP. Sewage drain lines led to an Imhoff tank for digestion. Sludge from the tank went to sludge drying beds, and the liquid effluent from the Imhoff tank flowed to a trickling filter and then to an outfall pit (Section 5.2.2.3, #39).

Because of low level radioactivety, sludge from the drying beds was removed and sent to the RWMC. The drain tiles and the outfall line were left in place and may be contaminated. Con-

tamination is believed to have come from personnel decontamination showers which drained to the sewage treatment plant.

15. Before the mid 1970s, waste solvent consisting primarily of kerosene and tributyl phosphate degradation products from fuel reprocessing, was burned in a solvent burner located near the main ICPP stack. This solvent was contaminated with low quantities of plutonium (0.1 Ci/L). Gases from the combustion process were routed directly to the ICPP main stack.

#15

Several releases were associated with the solvent burner. In September 1958, approximately 0.25 Ci of long-lived particulate activity was released from the solvent burner through the ICPP main stack. Additional contamination around the burner site resulted from a continual leakage of combustion products from the burner flue when the system was in operation. In March 1974, fluid was found leaking from a flange on top of the solvent burner hold tank, LE-102. The contaminated soil was placed in drums and removed. The burner, concrete pad, and soil under the pad have been removed and sent to the RWMC.

16. During the transfer of solution from a service waste diversion tank (WM-181) to the PEW evaporator, a leak occurred on the flange of the diversion valve. About 25 ft^3 of soil became contaminated with 500 mCi of Sr-90, 500 mCi of Cs-137, and 130 mCi of Ce-144. The release, which occurred in January 1976, was calculated to be about 12 gal of waste. The contaminated soil was left in place and covered with about 3 ft or more of clean soil.

#16

17. A mound of contaminated soil is located near the Peach Bottom Fuel Storage area. About 1000 yd^3 of soil contaminated to the low mR/hr (<10 mR/hr) range is stored in this area. This soil was excavated during construction on the CPP-603 fuel storage area south basin in 1955 and was contaminated from basin water disposed to the ground.

#17

18. A bottled gas storage building (CPP-616) used until the mid
#18 1970's, existed in the area where the CPP-668 office building now exists. Gas storage cylinders from throughout the plant were brought here for storage. Occasionally, some of these cylinders were contaminated. Contaminated cylinders were cleaned up, either at the site or at the decontamination facility. When clean, the cylinders were shipped off site. Any contamination has been cleaned up before construction in the area began.

19. On March 9, 1978 a leak developed in the waste transfer line
#19 between SFE-16 (Basin Liquid Waste Tank [CPP-603]) and WL-102 (process equipment waste [PEW] evaporator [CPP-604]). This underground line leak resulted in a discharge to the soil of 1-2 Ci of activity in 2000 gallons of liquid. Radiation readings ranged from 50 mR/hr to 3.5 R/hr. The leak occurred adjacent to the southwest corner of the Peach Bottom fuel storage area. Approximately 3 ft of topsoil was removed from the contaminated location, rest of contamination left in place and covered with clean soil. The line was abandoned in place after a new line was installed.

20. ICPP road contamination has occurred because of liquids being spilled during transport; for example, from water dripping from the surface of a contaminated cask. These releases were minor in terms of quantity of material released as well as in terms of area contaminated. These spills have been cleaned up when discovered or fixed in place with asphalt or other media.

21. Many pipelines connecting the various processes and facilities have failed from aging, corrosion or other causes. Some of these lines have been abandoned in place as they have been replaced with new lines. The location of these lines has been documented.[8]

22. Radioactive liquid waste from other INEL sites was routinely trucked to the ICPP where it was unloaded for evaporation in the ICPP PEW evaporator. Occasional spills at the unloading facility have been cleaned up as they occurred.

#20

23. Plant records show that solid waste including paper, rags, and contaminated metals was collected in a waste bin located on the ramp south of CPP-601 and then sent to the RWMC for disposal. When the ICPP first began operation, contamination of the waste bin area was not unusual. Any contamination originally present has since been removed.

#21

24. During ICPP operation, releases of radioactivity to the atmosphere have occurred. Releases included iodine, noble gases, ruthenium, and mixed fission products. Because of the short radiological half-life of the material involved, most radioactivity has decayed. In October 1958, cell ventilation filters at the Fuel Element Cutting Facility at the CPP-603 Fuel Storage Basin failed, releasing 1200 curies of particulate material to the atmosphere. Land adjacent to the facility was contaminated, and some contamination was carried onto the roadways within the ICPP. The contamination was cleaned up.

#22

5.2.2 Mixed Wastes

#23

5.2.2.1 ICPP Injection Well (#25) (MAH-FE-304). For many years, an injection well was used at the ICPP for disposal of cooling water and condensate. This well is still available for use on an emergency basis but has not been used routinely since February 1984. The waste discharged to the well contained minor quantities of radioactivity generally below existing guidelines. About 97% of the activity has been tritium, a hydrogen isotope with a 12.3-year half life. The well is presently 560 ft deep and extends 100 ft into the aquifer. The well casing is a 12-in. diameter carbon steel pipe lined with a 10-in. diameter high-density polyethylene pipe, perforated within the aquifer (450 to 555 ft below the surface).

Large quantities of water containing small quantities of radioactivity have been discharged to the well since ICPP began operation. Chemicals, generally within drinking water concentration standards, also have occasionally been discharged. Waste discharges are monitored and sampled to assure that discharges are within appropriate guidelines. During the ICPP operating life, accidental discharges have occurred which are described briefly in the following paragraphs.

a. On July 25, 1954, the contents of tank WG-100 were discharged to the well via the Service Waste System. A post-discharge analysis showed that 51 mCi of beta activity was released in 244,000 gal of waste. This exceeded the guidelines at the time.

b. In August 1956, approximately one curie of long-lived fission activity was released to the ICPP well.

c. In December 1958, about 29 curies of activity, including seven curies of Sr-90, were released to the ICPP disposal well from an unknown source in the plant.

d. In September 1969, two separate releases resulted in about 19 curies of fission product activity being released to the ICPP well through drain connections from dissolver transfer jet steam lines to the service waste headers. Released activity included Cs-137, Cs-134, Ce-144, and Sb-125. The total volume of water released was 3.28 million gal.

e. In December 1969, two releases occurred in which the quantity of Sr-90 released was higher than expected because the concentration of Sr-90 in the waste was higher than normal. About 1 curie of activity, consisting of 30% Sr-90 was released.

f. In March 1981, the discharge of mercury to the well exceeded 0.2 mg/L (0.207 mg/L), the present EPA Toxicity limit. This is the only month since specific sampling of toxic materials began that the limit was exceeded. No evidence of mercury migration within the aquifer has been found.

g. Fuel oil (Bunker C oil) used previously in the ICPP steam generators was heated prior to use by steam coils inside the fuel oil tanks. Steam flowing inside these coils then was condensed and discharged to the Service Waste System which in turn discharged to the injection well. At one time, a leak developed in the steam coils, and fuel oil may have entered the steam lines and in turn may have been discharged to the well. No information is available on the volume of oil that might have been discharged.

During the life of the ICPP, it is estimated that a total of 10,152 curies (approximately 97% tritium) have been released in 1.1×10^{10} gal of water. Because of radioactive decay, the radioactivity on December 31, 1984 was estimated to be 4,110 curies. Annual releases and radioactive content are shown in Table 5.1.

In addition to releases to the injection well, leaks in lines associated with the collection system for the well have occurred. In January 1970, the line from CPP-709, the service waste monitoring station, to the injection well was found to be leaking. The line was abandoned in place. Any released material would have been essentially pure water.

5.2.2.2 Tank Farm Area. Acidic high-level liquid wastes from fuel reprocessing activities are temporarily stored in stainless steel tanks inside concrete vaults until the waste can be converted to a solid. The tank farm area contains a complex piping network for transferring waste between tanks and to the calcining facilities. Various leaks in these underground pipes and releases from other sources have occurred throughout the years the plant has been operated. These releases are classified as mixed wastes because of the radioactive and acidic nature of the released materials and other chemicals (i.e., mercuric nitrate, fluorides, sulfates) which may be present in the waste.

TABLE 5.1
ANNUAL RELEASES TO THE ICPP INJECTION WELL (7)

Year(s)	Volume (millions of liters)	Curies[b]	Curies Remaining at 12-31-84 After Decay
1952-74	25,876	7651	2220
1975	1040	45	26
1976	1346	45	28
1977	1583	736	482
1978	1620	321	220
1979	1451	227	168
1980	1513	111	86
1981	2019	362	294
1982	2045	214	185
1983	2058	437	398
1984[a]	296	3	13
1985(c)	0.32	< 0.01	< 0.01
Total	40847.32	Total 10,152	Total 4,110

a. Flow to the ICPP Injection Well was officially terminated on Feb. 9, 1984.

b. The majority (approximately 97%) of the radioactivity is caused by the presence of tritium, a radioactive form of hydrogen which has a half life of 12.26 years.

c. This volume resulted from emergency use of the Injection Well on several occasions.

Waste releases associated with the tank farm are described in the following paragraphs:

26. In February 1954, a bucket of liquid waste from inside tank WM-
#24 180 was accidently dumped on the ground near the tank. A spot 3 by 6 ft was contaminated. The contaminated spot was cleaned up and was removed to the RWMC.

27. In August 1960, the area north of CPP-604 was found to be con-
#25 taminated from a ruptured line. About 9 yds^3 of contaminated soil were removed to the RWMC.

28. In May 1964, a steam flushing operation was being conducted to remove radioactive contamination from three pipelines to allow
#26 their tie-in to new lines. A leak developed in a hose coupling, and contaminated fluid and steam was dispersed over an area of about 3 to 4 acres inside the plant fence. About 10 acres outside the plant fence was also found to be contaminated above background. The contaminated area was cleaned up. The radioactive material released consisted of Sr-90 (18%), Ru-106 (3%), Ce-144 (57%), and Cs-137 (22%).

29. On April 4, 1974, excavation work in the tank farm area east of
#27 CPP-604 uncovered contaminated dirt reading up to 25 R/hr. Investigation showed that a 12-in. carbon steel pressure relief vent line had corroded badly. It was found that another vent line and other tie-ins had been added to the line, and acidic waste solutions had backed up into the pressure relief vent line through the stack drain. An estimated 1000 to 3000 curies of activity, consisting primarily of Cs-137 and Sr-90 with trace amounts of Cs-134 and Eu-154, were released. An estimated 225 yd^3 of soil were removed and taken to the RWMC. Total liquid leaking to the soil was estimated to be about 300 gal. The leak was determined to possibly have started as early as in the 1960's following startup of the

WCF. Although most of the contaminated soil was removed to the RWMC, small amounts of residual activity remained in place or was used for backfill.

30. On October 1, 1974, contaminated soil reading up to 40 R/hr was #28 discovered adjacent to a high-level liquid waste line about 10 ft south of Tank WM-181 vault near valve box A-6. Investigation showed that a 0.15-in. diameter hole had inadvertently been drilled through the pipe wall during installation of the pipe encasement system in 1955. When the pipe became more than half full, liquid leaked out. About 120 gal of waste containing as much as 6000 curies may have been released. Approximately 60 yd^3 of contaminated soil were removed to the RWMC. Other less-contaminated soil (approximately 3,000 curies) was left in place. The release occurred about seven feet below ground. The released activity consisted primarily of Cs-137, Ru-106, Ce-144, and Sr-90. Eleven test pipes were driven into the area of contaminated soil to determine the extent of contamination and to define the zone of contamination below the pipe encasement. The area of remaining contamination is approximately 9 ft in diameter by 2 ft deep (approximately 5 yd^3).

31. On November 14, 1974 contaminated solution was found seeping #29 from two separate areas (one north and the other west) at the base of the main stack. The soil had contamination readings up to 1500 R/hr. The contaminated soil for both areas (about 9 ft^2, no more than a few inches deep) was removed and sent to RWMC. The area has since been built over when the stack base was expanded.

32. In June 1975, contaminated soil was found near valve box B-9. #30 Contaminated soil from a 20 ft^2 area was removed and sent to the RWMC.

33. In September 1975, contaminated soil was found south of tank WM-183 in the tank farm area. The contaminated soil zone was approximately 150 by 20 ft along a backfilled pipe at a depth of 12 to 25. The discharged waste, estimated to be about 14,000 gal, apparently came from a corroded carbon steel line in the radioactive liquid waste transfer system. About 30,000 curies of radioactivity, consisting primarily of Cs-137, Sr-90, and Y-90 were released. Because of the quantity of contaminated soil (about 800 yd^3) and the depth of the contamination, it was recommended that the soil be left in place. The contaminated soil zone has been mapped based on samples obtained at the time.

#31

34. In December 1976, contaminated soil to 2 R/hr. was found southwest of valve box B-4. The contamination appeared to have resulted from leakage from the stand pipe adjacent to the valve box. Soil located 50 ft northwest of the same valve box was also found to be contaminated to 2 R/hr. The contaminated soil was left in place.

#32

35. During the summer of 1983, contaminated soil was encountered when work began to replace tank WL-102 north of CPP-604. About 14,000 yd^3 of contaminated soil was removed. Any soil contaminated to levels in excess of 30 mR/hr (approximately 2,000 yd^3) was boxed and sent to the RWMC for disposal. Soil contaminated to levels less than 30 mR/hr (12,000 yd^3) was moved temporarily to an area east of CPP-603. This soil (12,000 yd^3) has been put into a trench in the northeastern corner of the ICPP (Section 5.2.2.2 #36.)

#33

36. In August-September 1984 soil radioactively contaminated to levels of less than 30 mR/hr was moved from east of CPP-603 to a trench in the northeastern corner of the ICPP. This soil was originally excavated out of an area east of CPP-604 (Section 5.2.2.2 #35.)

#34

About 12,000 yd^3 of soil was buried between the animal and security fences in a trench beginning on the east side of the ICPP, south of the surface drainage line leading to the surface drainage percolation pond. The trench continues to the north perimeter and runs west along the north fence for about 500 ft. This trench was 10 ft deep and 45 ft wide at the top.

5.2.2.3 Other ICPP Areas.

37. In May 1972, during decontamination activities at the Waste Cal- #35 cining Facility (WCF), contamination was released to the ground. Investigation showed that radioactive decontamination solution leaked through an open valve on a decontamination line which connected to a transport air line from the WCF to solids storage. It was estimated that 20 to 30 curies of long-lived fission products and corrosive decontamination solutions had been released. Several thousand square feet of area was contaminated. The area was sprayed with a material to hold the contamination and covered with plastic until the soil could be packaged and removed. About ten ton of contaminated gravel were removed and sent to the RWMC for disposal.

38. On November 5, 1974, while dilute decontamination solution was #36 being transferred from the WCF to tank WL-102, about 750 gal of solution leaked from the line into a manhole and from there to the ground. About one-half curie of radioactivity in the dilute corrosive solution was released between the WCF and the stack. The contaminated soil was left in place.

A previous leak in the same area was discovered on October 15, 1974. Corrosion occurred on an orifice plate allowing waste to be discharged to the ground. Radiation readings up to 20 R/hr were found at a depth of 7 to 8 ft. Some of the contaminated soil was removed and sent to the RWMC, and the rest was left in place. The contaminated area was about 70 by 10 ft.

39. Two gravel pits near the northeast corner of the ICPP have been used for the discharge, disposal, and decontamination area of miscellaneous materials. Sanitary waste, service waste, construction debris, and possibly miscellaneous chemical wastes were discharged here. The gravel pit located outside the ICPP fence was used as a decontamination area for radioactively contaminated construction equipment. This pit has since undergone decontamination and will eventually be used for surface water drainage. The other gravel pit, located inside the ICPP security fence, was used to contain the outfall from the Sewage Treatment Plant which was decommissioned in 1982. When this plant was decommissioned, the pit was used as a landfill for radioactively contaminated construction equipment. The equipment has been left in place and the pit filled in and covered.

#37

40. During the summer of 1985, while repairing a portion of the CPP-603 roof, workmen noticed fibrous material in the crevasses of the roof. Sampling and analysis of the CPP-603 area (roof and surface soil) confirmed the presence of chrysotile (asbestos fibers) and low-level radioactive hot spots (600-1800 cpm), possibly from a filter failure that occurred here earlier. Additional investigations were conducted at other ICPP locations where transite had been used for outside walls and roofs. This transite (40% chrysotile asbestos fiber - 60% Portland cement) was found to be friable on CPP-601, -602, -603, -604, -605 -606, -640, -644, and -648. However, radioactive hot spots seem to be only in the CPP-603 area.

#38

5.2.3 Chemical Wastes

41. HF Storage Tanks (YDB-105) and Dry Well. Hydrofluoric acid for the process makeup area was received and stored in tank (YDB-105) located southwest of CPP-640. The tank overflow drained and vented to a limestone neutralization pit beneath the tank. The neutralized solution drained to a dry well located south of CPP-637, east of CPP-651. The volume of waste

#39

(approximately 7M HF) sent to the dry well is estimated to have been about 800 gal per year. The storage tank (YDB-105) is scheduled for ripout in 1986.

42. Lime Pit by CPP-601 and French Drain. A lime pit is located #40 south of the HF tank (YDB-105). Vapors from an HF holding tank vented to this pit. The volume of acid discharged to this pit is unknown. A French drain located inside the southwest corner of the CPP-601 building also discharged to this pit. These areas are no longer in use.

43. Fire Training Pits. Two small depressions between CPP-603 and #41 CPP-602 were used for the burning of organic materials for fire brigade training. The organic material was placed in a small pit and ignited. Fire brigade members would then immediately extinguish the blaze. The area has since been covered with Buildings CPP-663 and CPP-666 and no trace of the areas remain.

44. CPP-637 Drainage Ditch. A normally dry drainage ditch located #42 west of CPP-637 is used to control surface water runoff during periods of rain and snow. Some laboratory and pilot plant chemicals (nonradioactive) may have been disposed of in this ditch.

45. Grease Pit. A grease pit existed south of CPP-637. Oils and #43 greases of an unknown quantity may have been discharged to this pit. The pit was filled in when the unirradiated fuel storage building security upgrade (CPP-651) was completed. The pit is presently located under CPP-651.

CPP-43

46. A grease pit was located south of CPP-608. This pit was used for the discharge of oils and greases. In addition, unknown quantities and types of chemicals also may have been discharged to the pit.

#44

47. CPP-621 Chemical Storage Area. Various acids (HCl, HNO_3, HF, and H_2SO_4) and aluminum nitrate are stored in large metal and fiberglass tanks encircled by earth berms south of CPP-621. The storage area consists of 8 tanks, 2 open bottom limestone pits and 6 French drains.

#45

The HF tank is surrounded by an open bottom pit which contains enough limestone to neutralize the contents of the HF tank if the acid and limestone were contained in a completely mixed tank. Any leakage in this pit goes directly to the soil. However, the overflow from the HF tank is currently being rerouted to an overflow collection vessel.

The HCL and H_2SO_4 tanks are surrounded by an open bottom pit which drains into the HF containment structure. These acid tanks have been taken out of service.

The 3 aluminum nitrate tanks and 2 nitric acid tanks all have French drains for overflow discharges. The overflow lines have been rerouted to two overflow containment vessels.

Some acid has overflowed or spilled into these drains and pits. In March 1982, HNO_3 was delivered to tank CS-100. Approximately 1200 gallons of acid overflowed to the French drain and eventually the ground. The acid was not contained since the berm had been removed for a construction project. The overflowed acid pooled along side the concrete wall being installed for the pipe trench. Several thousand pounds of soda ash was applied to neutralize the acid and the contaminated soil was excavated for disposal.

48. Pilot Plant Tank Release. In November 1978, a permanent tank in the CPP-637 courtyard leaked about 450 gallons of nonradioactive simulated zirconium dissolver product to the ground when a coupling on the bottom of the tank failed. The solution was neutralized and most of the contaminated soil was removed for disposal.

#46

49. Pilot Plant Storage Area. Chemicals used in pilot plant
#47 operations were stored in barrels on pallets in a location northwest of CPP-620 by CPP-637. Leakage (a few liters) of acid and organics (primarily kerosene) has occurred to the soil. The contaminated soil was left in place.

50. French Drain South of Waste Processing Facility (WCF). A
#48 French drain south of the WCF was used for disposal of nitric acid and other chemicals consisting primarily of aluminum nitrate and calcium nitrate. Use of the drain has been discontinued. There are no records of the types or quantities of chemicals disposed of to this drain. Prior to construction of the French drain, chemicals were disposed of directly to the soil in a trench located by the present French drain.

51. PCB Transformer Yard (CPP-705). As part of the ICPP Utilities
#49 Replacement and Expansion Project (UREP), several 2400 volt transformers were removed from service. These included the XFR-PHE-4, XFR-PHE-5, and XFR-PHE-6 transformers located in CPP-705. These transformers contained polychlorinated biphenyls (PCBs) at concentrations up to 330 ppm. The transformers were transferred to a staging area west of CPP-660 until they could be shipped to a commercial disposal facility.

During an inspection of the staging area in July 1985, leakage around valves and fittings was noted on some of the transformers. The transformer yard was inspected and oil was found on some of the concrete pads. It is not known if oil leaked to the ground.

52. PCB Transformer Yard (CPP-731). As part of the ICPP Utilities
#50 Replacement and Expansion Project (UREP), several 2400 volt transformers were removed from service. This included a transformer (XFR-YDC) located in CPP-731. The transformer contained polychlorinated biphenyls (PCBs) at a concentration

of 400 ppm. The transformer was transferred to a staging area west of CPP-660 until it could be shipped to a commercial disposal facility.

During an inspection of the transformer yard in July 1985, leakage around valves and fittings was noted. It is not known if oil leaked to the ground but oil was found on the concrete pad.

53. PCB Staging Area. As part of the ICPP Utilities Replacement
#51 and Expansion project (UREP), several 2400 volt transformers were removed from service. These included the XFR-YDC transformer in CPP-731, and the XFR-PHE-4, XFR-PHE-5, and XFR-PHE-6 transformers located in CPP-705. These transformers contained polychlorinated biphenyls (PCBs) at concentrations up to 400 ppm. The transformers were transferred to a staging area west of CPP-660 until they could be shipped to a commercial disposal facility.

During an inspection of the staging area in July 1985, leakage around valves and fittings was noted on some of the transformers. Some leakage to the soil had occurred. In August 1985, approximately 40 barrels of PCB-contaminated soil and debris and a 15-ton concrete pad from CPP-718 were placed in the staging area until disposal. The barrelled soil contained up to 31 ppm of PCB, and the pad was contaminated to approximately 134 ppm. Some of the concrete pad pieces fell onto the soil at the staging area and possibly contaminated the area. All barrelled soil, debris, transformers, and concrete have been shipped from the area to a commercial disposal facility.

54. Pickling Shed. During original ICPP construction, a pickling
#52 shed to treat piping and other structural materials with mineral acids was located east of the present location of CPP-631. Spent solutions were disposed of to the liquid waste storage tanks. The temporary wooden structure was torn down

around 1954. No radioactivity was involved, and any acid released would have been neutralized by the soil. Extensive construction activity in the area has occurred since the site was used.

55. Paint and Paint Solvent Area. During construction for the FAST
#53 building (CPP-666) a painting subcontractor stored paint and paint solvent drums on pallets located south of CPP-697. Some of these 30-40 drums may have leaked to the ground. In 1983 the drums were shipped to a commercial disposal site.

56. Drum Storage Area. In 1985, 30-40 drums of organic solvent and miscellaneous chemicals were stored in drums on pallets west of
#54 CPP-660. These drums were originally stored near the northwest corner of CPP-660 and were later moved to the field west of CPP-660. Several of these drums may have leaked to the soil. In August 1985, the drums were shipped to a commercial disposal facility.

57. Mercury-Contaminated Area. During a baseline study of
#55 controlled pollutants at the ICPP in 1984, painters/carpenters were observed discarding used paint solvent to the soil in an area south of T-15. In August 1985 seven soil sample analyses showed mercury levels ranging from 48 to 236 ppb. Some soil has been removed and sent to a commercial disposal site, but the area has not been fully characterized.

58. Nitric Acid Contamination. In February 1968, waste from the
#56 west side nonradioactive liquid waste holdup tank (WL-103) was being pumped to the westside Monitoring Station (CPP-734) when the line developed a leak and waste surfaced near CPP-734. No records of the quantity discharged or the area impacted could be found.

59. Sulfuric Acid Spills. In October 1984, sulfuric acid was being transferred to a storage tank located east of CPP-603 from a delivery truck. The tank overfilled, and 50 gal of sulfuric acid spilled. The acid was neutralized with 1800 lb of soda ash and flushed with 30,000 gal of water. #57

In June 1985, the storage tank, which had just been filled, developed a leak, and 4500 gal of acid leaked to the ground. A dike was constructed to contain the acid until it could be neutralized with dolomite. The soil was removed, neutralized, and packaged. Cleanup of the area has been completed.

60. PEW Evaporator Overheads. The line from the PEW evaporator to the monitoring station developed minor leaks in August 1954. A similar leak between the evaporator and the CPP-751 Service Waste Diversion System was discovered in September 1976. These leaks released waste containing about 0.2 M nitric acid to the soil. In the September 1976 incident, about 20,000 gal of condensate leaked to the soil. #58

61. Kerosene Spill. In September 1983, kerosene was being transferred from a storage tank to the New Waste Calcining Facility. About 200 gal overflowed to the vent line outside the containment barrier. Later, another 60 gal also was spilled. #59

62. Old Paint Shop. An old paint shop existed north of CPP-637. Paint and paint solvents may have been disposed of here. This building then called CPP-615 (hazardous storage building on old prints) was east of the bottled gas building and was located about where CPP-645 is located now. #60

5.3 Unit Summary

The releases described in the previous section are summarized in Table 5.2 and are shown on the map in Figure 5.1. In some cases, exact boundaries are uncertain and vary with the degree of contamination. Also, Table 5.2 lists and identifies those units which were (a) ranked (see Section 6), (b) reported to have been cleaned up, and (c) have a potential for further environmental concern.

TABLE 5.2

SUMMARY OF ICPP WASTE RELEASES

Location	Date	Description	Potential for Environmental Concern	Ranked[a]
I. Radioactive				
A. ICPP Fuel Storage Basin Area (CPP-603)				
1. Concrete settling basin, vault and dry wells	1953-1966	Contaminated cooling water Cl^-, and NO_3^-. BIF filter has been sent to RWMC.	Low	Y
2. French Drain West of CPP-603	1960's	Contaminated cooling water. Removed, packaged, and sent to RWMC.	None	N
3. CPP-603 Temporary Storage Area	1953-1970's	Solid storage area. Buried material has been been removed. Some soil contamination left in place.	Low	Y
4. Soil Around Settling Tank	May 1953	Soil around settling tank was found to be contaminated. Soil removed, area cleaned.	None	N
5. Soil Around Settling Basin	Sept. 1954	Soil contaminated when basin overfilled. Soil removed, area cleaned.	None	N
6. Trench East of Fuel Storage Basin	1960's	About 300,000 gallons of 10^{-3} to 10^{-4} Ci/ml activity water also containing chlorides was discharged to trench. Contaminated soil left in place.	Very Minor	Y

(a) Ranked (Y) or not Ranked (N)

TABLE 5.2 (Contd)

SUMMARY OF ICPP WASTE RELEASES

Location	Date	Description	Potential for Environmental Concern	Ranked[a]
7. Soil Contamination (Northwest CPP-642)	Sept. 1972	One curie of activity released from collection tank vent line. Contaminated soil was removed and sent to RWMC.	None	N
8. Basin Filter System Line Failure	April 1973	Approximately 21,000 gallons of water with low activity leaked to soil. Contaminated soil left in place.	Low	Y
9. Soil Contamination (Northeast Corner of South Basin)	July 1975	Soil contaminated to a level of about 2 R/hr at contact. Surface soil removed. Some contamination may still be present.	Minor	Y
10. Plastic Pipeline Break	Dec. 1976	About 800 gallons of water from fuel storage basin drained onto floor. Some water drained to soil and asphalt. Area cleaned.	None	N
11. Sludge and Water Releases	Feb. 1978	Up to 500 gallons of contaminated water and sludge released during cleanup operations. Area cleaned.	None	N
12. Contaminated Paint Chips and Pad	May 1984	Paint chips from contaminated equipment storage pad removed and sent to RWMC. Area cleaned.	None	N

(a) Ranked (Y) or not Ranked (N)

TABLE 5.2 (Contd)

SUMMARY OF ICPP WASTE RELEASES

Location	Date	Description	Potential for Environmental Concern	Ranked[a]
B. Other ICPP Areas				
13. Pressurization of Solid Storage Cyclone	Oct. 1976	Cyclone pressurized and blew calcine to soil. An area approximately 300 ft^2 to the northeast of the WCF was contaminated. The area was cleaned and covered with clean soil.	None	N
14. Sewage Drain Tiles and Outfall Line	1951? to 1982	Sewage Treatment plant located west of CPP-664, decommissioned in 1982. Sludge from plant sent to RWMC. Drain tiles and outfall line in place.	Minor	Y
15. Solvent Burner	1953? to mid 1970s	Atmospheric releases of radioactivity. Contaminated organic materials (kerosene, etc.) leaked to soil. The burner, concrete pad, and soil under pad have been removed and sent to RWMC. Area cleaned.	None	N
16. Leak in line from WM-181 to PEW (Contaminated Soil)	Jan. 1976	About 25 ft^3 of soil contaminated by 12 gallons of waste containing 1-2 curies of activity. Contaminated soil covered with clean soil.	Minor	Y

(a) Ranked (Y) or not Ranked (N)

TABLE 5.2 (Contd)

SUMMARY OF ICPP WASTE RELEASES

Location	Date	Description	Potential for Environmental Concern	Ranked[a]
17. Soil Storage Area (Peach Bottom)	1955	About 100 yd^3 of soil contaminated with <10 mR/hr radioactivity buried in mounds and covered with clean soil.	Minor	Y
18. Gas Storage Building	1953-mid 1970's	Gas cylinders, contaminated with radioactivity, were stored here. Any contamination was removed. Area cleaned.	None	N
19. CPP-603-604 Waste Line	Mar. 9, 1978	Discharge to soil of 1-2 curies of activity in 2000 gallons of liquid. Radiation readings ranged from 50 mR/hr to 3.5 R/hr. Leak occurred adjacent to southwest corner of the Peach Bottom Fuel Storage area. Some contamination removed, rest left in place.	Minor	Y
20. Roads	Various	Contamination of roadways has occurred from water containing radioactivity leaking to road during fuel transport. Contamination has been removed, roads cleaned.	None	N

(a) Ranked (Y) or not Ranked (N)

TABLE 5.2 (Contd)

SUMMARY OF ICPP WASTE RELEASES

Location	Date	Description	Potential for Environmental Concern	Ranked[a]
21. Pipelines	Various	Pipelines carrying radioactive solutions have sometimes been abandoned in place when new lines are installed. The location of these lines has been documented.[8]	None	N
22. Radioactive Waste Unloading Areas	Various	Liquid waste from other INEL areas being unloaded for PEW evaporation has occasionally spilled at unloading area. Spills have been cleaned up.	None	N
23. CPP-601 Solid Waste Bin	Various	Minor contamination from storage of miscellaneous materials prior to disposal. All contamination associated with the waste has been removed.	None	N
24. Airborne Releases	Various	Releases of radioactive gases to the atmosphere have occurred. Any soil contamination has been cleaned up.	None	N
II. Mixed Wastes				
A. ICPP Injection Well				
25. Releases to Well	Various	10,152 curies of radioactivity (decayed to 4,110 curies as of Dec. 31, 1984) discharged in 1.1×10^{10} gal of water.	Moderate	Y

(a) Ranked (Y) or not Ranked (N)

TABLE 5.2 (Contd)

SUMMARY OF ICPP WASTE RELEASES

Location	Date	Description	Potential for Environmental Concern	Ranked[a]
		Mercury and other chemicals discharged. Minor quantities of organic materials discharged.		
B. Tank Farm Area				
26. Bucket Spill	Feb. 1954	Spill of acidic-radioactive waste. Area cleaned up and contaminated soil sent to RWMC.	None	N
27. Contaminated soil (North of CPP-604)	Aug. 1960	Acidic-radioactive waste released from ruptured line. About 9 yd^3 of soil removed to the RWMC, area cleaned.	None	N
28. Steam Flushing	May 1964	Contamination released to surface during steam flushing of lines. Contaminated soil cleaned up.	None	N
29. Contaminated Soil (East of CPP-604)	April 4, 1974[b]	300 gallons of acidic-radioactive waste containing up to 3000 curies of radioactivity released to soil from corroded vent line. Most of soil removed, some left in place.	Minor	Y

(a) Ranked (Y) or not Ranked (N)
(b) Date of Discovery

TABLE 5.2 (Contd)

SUMMARY OF ICPP WASTE RELEASES

Location	Date	Description	Potential for Environmental Concern	Ranked[a]
30. Contaminated Soil (South of WM-181)	Oct. 1, 1974[b]	About 120 gallons of acidic-radioactive waste containing up to 6000 curies released to soil because of a hole drilled in a pipe at time of installation. Most of soil removed, approximately 5 yd^3 of soil left in place.	Minor	Y
31. Contaminated Soil (North and West of Main Stack)	Nov. 14, 1974	A release of acidic-radioactive waste around the base of the stack (2 locations). Contaminated soil was removed, area clean.	None	N
32. Contaminated Soil (Near Valve Box B-9)	June 1985[b]	A 20-ft^2 area was contaminated with acidic-radioactive waste. The soil was removed, area clean.	None	N
33. Contaminated Soil (South of WM-183)	Sept, 1985[b]	About 14,000 gallon of acidic liquid waste containing up to 30,000 curies of radioactivity released underground. Contaminated soil remains in place.	Moderate	Y
34. Contaminated Soil (Southwest of Valve Box B-4 and Northwest of Valve Box B-4)	Dec. 1976[b]	A release of acidic-radioactive waste contaminated to 2 R/hr (2 locations). Contaminated soil left in place.	Y	

(a) Ranked (Y) or not Ranked (N)
(b) Date of Discovery

TABLE 5.2 (Contd)

SUMMARY OF ICPP WASTE RELEASES

Location	Date	Description	Potential for Environmental Concern	Ranked[a]
35. Contaminated Soil (Northeast of CPP-604 by WM-102)	Summer 1983[b]	Soil contaminated with acidic radioactive waste and mercuric nitrate. Most of contaminated soil was removed, some contamination left in place.	Minor	Y
36. Soil Storage Area (Northeast Corner ICPP)	Aug.-Sept. 1984	Soil contaminated with acidic-radioactive waste and mercuric nitrate, buried in a trench between the animal and security fence.	Minor	Y
C. Other ICPP Areas				
37. WCF Decontamination Spill	May 1972	Corrosive-radioactive decontamination solution released to ground. Soil removed to RWMC, area cleaned, and stabilized.	None	N
38. Transfer Line Leak (WCF to WL-102)	Nov. 5, 1974	Decontamination solution from WCF being transferred to waste tank. About 750 gallons of corrosive-radioactive solution containing 0.5 curies released to a manhole and then to soil. Further releases occurred in the same area when an orifice plate corroded. Contaminated soil left in place.	Minor	Y

(a) Ranked (Y) or not Ranked (N)
(b) Date of Discovery

TABLE 5.2 (Contd)

SUMMARY OF ICPP WASTE RELEASES

Location	Date	Description	Potential for Environmental Concern	Ranked[a]
39. Gravel Pits	Various	Two gravel pits used for equipment decontamination, construction rubble disposal, service waste, etc. Gravel pit inside ICPP fence used as a landfill for radioactively contaminated construction equipment. The equipment has been left in place and the pit filled in and covered.	Minor	Y
40. Asbestos	Various	Weathering of transite on several ICPP buildings and roofs has resulted in asbestos being released to the air and soil. CPP-603 transite has radioactive hot spots.	Minor	Y
III. Chemical Wastes				
41. HF Storage Tank (YDB-105) and Dry Well	--	HF acid received and stored in tank YDB-105, located southwest of CPP-640. The tank overflow drained and vented to a limestone neutralization pit beneath the tank. The neutralized solution drained to the dry well located south of CPP-637. YDB-105 scheduled for rip out in 1986. Pit area and drywell will be characterized.	Minor	Y

(a) Ranked (Y) or not Ranked (N)
(b) Date of Discovery

TABLE 5.2 (Contd)

SUMMARY OF ICPP WASTE RELEASES

Location	Date	Description	Potential for Environmental Concern	Ranked[a]
42. Lime Pit by CPP-601 and French Drain	--	Lime pit located south of YDB-105. The French drain which drained to the lime pit is located inside the southwest corner of CPP-601. These areas are no longer in use. Pit area and French drain line area will be characterized.	Minor	Y
43. Fire Training Pits (Between CPP-602 and CPP-603)	Early	Oils and organics burned in open pits for fire training. The two areas have since been covered with Buildings CPP-663 and CPP-666.	None	N
44. Drainage Ditch (West of CPP-637)	--	Some laboratory and pilot plant chemicals (nonradioactive) may have been disposed of in the ditch.	Minor	Y
45. Grease Pits (By CPP-637)	--	Grease pit south of CPP-637 (under CPP-651) used for disposal of unknown materials.	None	Y
46. Grease Pit (By CPP-608)	--	Grease pit south of CPP-608, used for disposal of unknown materials. Pit has been filled in.	Minor	Y
47. Chemical Storage Area (CPP-621)	--	Spills of acid or aluminum nitrate, during filling of chemical storage tanks. Some spills cleaned up at time of occurrence.	Minor	Y

(a) Ranked (Y) or not Ranked (N)

TABLE 5.2 (Contd)

SUMMARY OF ICPP WASTE RELEASES

Location	Date	Description	Potential for Environmental Concern	Ranked[a]
48. Pilot Plant Tank Release	Nov. 1978	Feed tank released 450 gallons of zirconium fluoride in the CPP-637 courtyard. Most of contaminated soil removed.	Minor	Y
49. Pilot Plant Storage Area	--	Chemicals used in pilot plant operations were stored in barrels on pallets northwest of CPP-620. Leakage of acid and organics has occurred to the soil.	Minor	Y
50. WCF French Drain (South of CPP-633)	--	Variety of non-radioactive chemicals discharged to French drain south of CPP-633. Quantities unknown.	Minor	Y
51. PCB Transformer Yard (CPP-705)	1985	Three transformers removed from service because of an electrical upgrade. Transformers contained polychlorinated biphenyls (PCBs) at concentrations up to 330 ppm. Leakage around valves and fittings was noted on some of the transformers and concrete pads. It is not known if oil leaked to the ground.	Minor	Y

(a) Ranked (Y) or not Ranked (N)

TABLE 5.2 (Contd)

SUMMARY OF ICPP WASTE RELEASES

Location	Date	Description	Potential for Environmental Concern	Ranked[a]
52. PCB Transformer Yard (CPP-731)	1985	Transformer removed from service because of an electrical upgrade. Transformer contained polychlorinated biphenyls (PCBs) at a concentration of 400 ppm. Leakage around valves and fittings was noted on the transformer. It is not known if oil leaked to the ground.	Minor	Y
53. PCB Staging Area	1984-1985	Transformers were removed from service because of an electrical upgrade. These transformers were transferred to a staging area located west of CPP-660. The transformers contained polychlorinated biphenyls (PCBs) at concentrations up to 400 ppm. PCB oil leaked to the soil from around valves and fittings. Also, in August 1985, approximately 40 barrels of PCB contaminated soil, debris and a concrete pad from CPP-718 were placed in the staging area until disposal. All barrelled soil, debris, transformers, and concrete have been shipped to a commercial disposal facility.	Minor	Y

(a) Ranked (Y) or not Ranked (N)

TABLE 5.2 (Contd)

SUMMARY OF ICPP WASTE RELEASES

Location	Date	Description	Potential for Environmental Concern	Ranked[a]
54. Pickling Shed	Early	A pickling shed to treat piping and other structural materials with mineral acids was located east of CPP-631. The structure was torn down aroung 1954. No radioactivity was involved, and any acid released would have been neutralized by the soil.	None	N
55. Paint and Paint Solvent Area (South of CPP-697)	1983	Paint and paint solvent drums may have overflowed or leaked and contaminated soil.	Minor	Y
56. Drum Storage Area (West of CPP-660)	1985	Drums containing solvents and chemicals may have leaked to soil.	Minor	Y
57. Mercury Contaminated Area (T-15)	1984	Paints and solvents containing toxic material oxide, discharged to ground.	Minor	Y
58. Nitric Acid Contamination (WL-103 to CPP-734)	Feb. 1968	Nitric acid released to soil when line corroded. No records of the quantity discharged or the area impacted.	Minor	Y
59. Sulfuric Acid Spills (East of CPP-606)	Oct. 1984 June 1985	50 gallons of sulfuric acid spilled when tank overfilled. 4500 gallons of sulfuric acid later released to soil. Soil neutralized and area cleaned up in both cases.	None	N

(a) Ranked (Y) or not Ranked (N)

TABLE 5.2 (Contd)

SUMMARY OF ICPP WASTE RELEASES

Location	Date	Description	Potential for Environmental Concern	Ranked[a]
60. PEW Evaporator Overheads	Aug. 1954 Sept. 1976	Evaporator overheads containing approximately 0.2 M nitric acid leaked to ground. Contaminated soil has been left in place.	Minor	Y
61. Kerosene Spill	Sept. 1983	Approximately 260 gallons of kerosene overflowed to the vent line outside the containment barrier. Later, another 60 gallons also was spilled.	Minor	Y
62. Old Paint Stop	Early	Disposal of chemicals, paint, and paint solvents from an old paint shop may have occurred in the present location of CPP-645.	None	N

(a) Ranked (Y) or not Ranked (N)

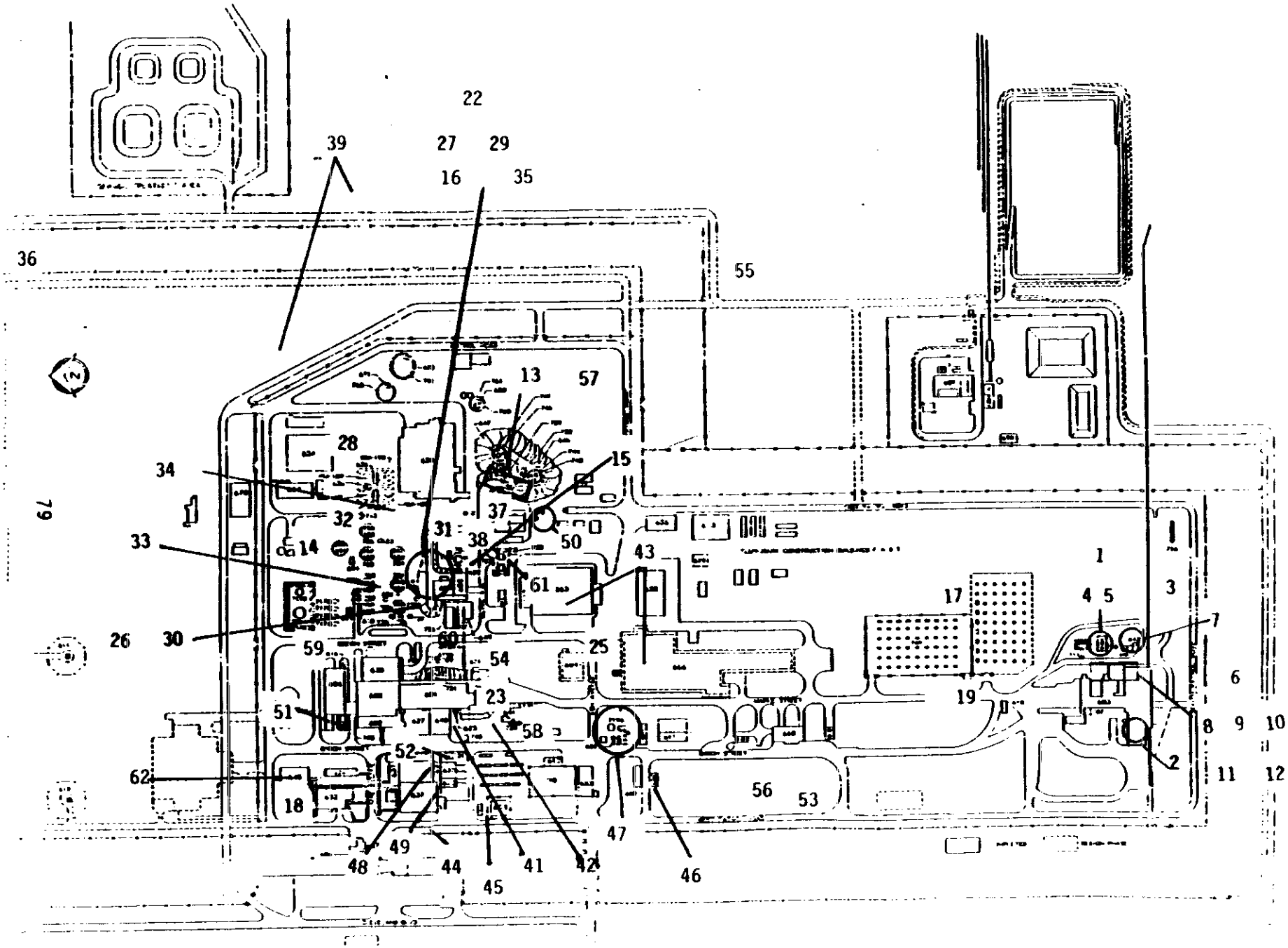

FIGURE 5.1 Location of ICPP Waste Releases

6.0 CONCLUSIONS

The Idaho Chemical Processing Plant (ICPP) has operated as a nuclear reprocessing plant since 1953. During this time, radioactive materials have been handled, and hazardous materials consisting primarily of acids, caustics, mercury, and miscellaneous chemicals have been used. Because the potential hazards associated with handling radioactive materials were recognized early in the history of the ICPP, care has been taken to minimize releases of both radioactive and chemical pollutants to the environment and to quickly clean up any spills that do occur. Furthermore, environmental releases at the ICPP have had only minimal impact on the public because of factors which were considered when the site was chosen many years ago. These factors include:

1. Lack of permanent population on the INEL.

2. Low population surrounding the INEL.

3. Distance from the surface to the groundwater.

4. Low precipitation and high evaporation which minimize the transport of released materials to the groundwater.

5. Soil characteristics which tend to neutralize acidic liquids and retain most chemicals and radionuclides as they migrate to or through the ground water.

6. A closed basin for surface water accumulation that drains into the ground rather that flowing to a surface river system.

The ICPP, however, is located above the Snake River Plain Aquifer, and protection of the purity of the water in the aquifer is of prime importance. Extreme care therefore has been, and continues to be, used to assure that any releases to the environment are within appropriate limits to prevent contamination of the aquifer.

The releases of chemicals and radionuclides at the ICPP have been described in detail in Section 5. For completeness, all known, suspected, or reported units and releases identified during this study have been included in Section 5 and are listed in Table 5.2, regardless of the extent or consequences of the releases. Many of the releases described in Section 5 are minor in terms of quantities of materials released. Furthermore, many of these units were treated and cleaned up at the time the release was discovered. In some cases, the extent of cleanup is not definitely known.

In some cases, quantities of waste involved, types of waste involved, and the area impacted could not be determined from existing information. In these cases, rankings were made based on the most conservative estimates and available information. Available information has been presented in Section 5.

The units identified in Section 5 were ranked using the modified Hazard Ranking Systems which places a numerical score on each unit. The numerical score prioritizes the units for cleanup. Only those units where waste is known or believed to exist were ranked; units which are reported to have been cleaned up were not ranked; however, units where the extent of cleanup is not known were also ranked. Efforts were made to rank all units conservatively. The ranking is primarily based on the ground water migration pathway since it is the major potential path for contamination at the ICPP. Ranking scores were based on the known or estimated quantities of chemi- cals or radioactive material released, the toxicity and persistence of the released material, depth of 450 ft to the aquifer, net evaporation rate of 27 in. of water, a permeable zone for fluid movement, a popula- tion of 1200 workers at the ICPP, and the distance from the point of release to the ICPP supply wells. Where waste releases contained both radioactive materials and chemicals, rankings were completed for both components and the highest ranking was used. High-level radioactive waste releases were assumed to occur in high-acidic solution which could contain fluorides or mercury.

Ranking results are shown in Table 6.1, and the location of these ranked units is shown in Figure 6.1. No units were found which are a cause for immediate environmental concern. However, two units require further study and possible action. Specific units are discussed in the following paragraphs.

1. ICPP Injection Well (Unit 1)

   The ICPP well discharges directly to the Snake River Plain Aquifer. It has not been used routinely since February 1984. During the period of time that it was used, over 1.1×10^{10} gal of liquid consisting primarily of cooling water with minor quantities of radioactive and toxic chemicals (mercury) were released to the well. Although most of the radioactive and toxic chemicals appear to have been retained near the well, tritium, a radioactive isotope of hydrogen has migrated from the area a distance of 9 miles. A release of mercury in March 1981 resulted in the well receiving the highest ranking. However, the potential for migration within the aquifer is low. This unit received a ranking score of 34.

2. Tank farm area (Units 2, 9, 10, 11, and 13)

   Highly radioactive acidic solutions containing zirconium fluoride, aluminum nitrate, mercuric nitrate, and other chemicals have been released to the tank farm area because of leaking pipes and other causes. Although some of the contaminated surface soil has been replaced with clean soil, the area still is contaminated below the surface. Studies have shown that the soil is safer in its present location than if removed elsewhere. Unit 2, because of the high levels of radioactivity involved, received a higher ranking than other units.

TABLE 6.1

Ranking of Disposal Units

	Disposal Unit	Numerical Ranking	Type[a]
1.	ICPP Injection Well	34	M
2.	Tank Farm Contaminated Soil (South of WM-183)-9/75	18	M
3.	PCB Transformer Yard (CPP-705)	13	C
4.	PCB Transformer Yard (CPP-731)	13	C
5.	PCB Staging Area	13	C
6.	Paint and Paint Solvent Area (South of CPP-697)	13	C
7.	Mercury Contaminated Soil (South of T-15)	13	C
8.	Pilot Plant Tank Release (CPP-637 courtyard)	13	C
9.	Contaminated Soil - 10/74 by WM-181	13	M
10.	Contaminated Soil by CPP-604 - 4/74	13	M
11.	Contaminated Soil Northwest and Southwest of Valve Box B-4	13	M
12.	Included in unit 11	-	-
13.	Contaminated Soil by WL-102 Northest of CPP-604	13	M
14.	Contaminated Soil Burial by Northeast Corner of ICPP	13	M
15.	Asbestos	12	M
16.	WCF French Drain	11	C
17.	Leak in Line from WCF to WL-102	11	M
18.	Kerosene Release	9	C
19.	CPP-637 Storage Area	9	C
20.	CPP-608 Grease Pit	9	C
(b)21.	CPP-651 Grease Pit (Unit deleted)	-	-
22.	PEW Evaporator Overheads	9	C
23.	Drum Storage Area by CPP-660	8	C
24.	HF Acid Storage Tank	8	C
25.	Limestone Pit by CPP-601 Berm	7	C
26.	CPP-637 Drainage Ditch	7	C
27.	HNO_3 Leakage (by CPP-734)	7	C
28.	Gravel Pits	7	M
29.	CPP-621 Chemical Storage	7	C
30.	Peach Bottom Contaminated Soil	7	R
31.	CPP-603-604 Transport Line Leak - 3/78	4	R
32.	CPP-603 Lay-down Area (Temporary Storage Area)	4	R
33.	CPP-603 Vault and Drywell	4	R
34.	Trench by CPP-603	2	R
35.	WM-181 Transfer Line to Evaporator - 1/76	1	R
36.	Sewage Drain Tiles and Outfall Line	1	R
37.	Soil - NE Corner of South Basin (CPP-603)	1	R
38.	Basin Filter System Line Failure (CPP-603)		

(a) Radioactive (R) ,Mixed (M), or Chemical (C)
(b) The grease pit is under CPP-651. No further action.

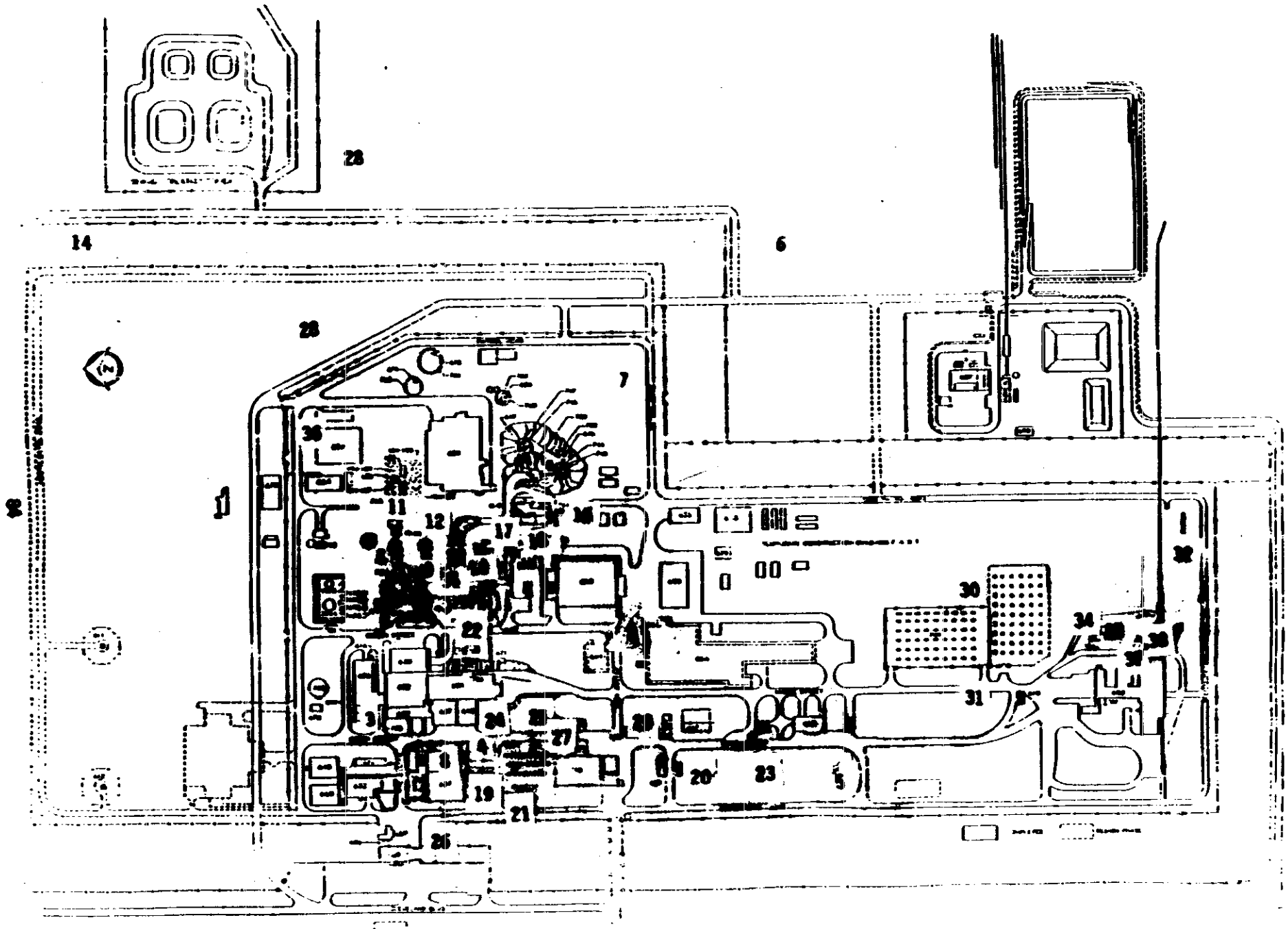

FIGURE 6.1 Location of Ranked Units at ICPP

This unit will require further study. Continued monitoring and sampling will be required to determine if migration is occurring and the potential for further environmental damage. Because of small quantities of waste involved, other units are of minor concern.

3. PCB Transformer Yards and Staging Areas (Units 3, 4, and 5)

The toxic nature of PCBs and their persistence in the environment resulted in an mHRS score of 14. Because of the small quantities present, there is low potential for further damage. Sampling and characterization will be required to determine the extent of contamination.

4. Chemical Spills (Units 6, 7, 8, 19, 23, 26, and 27)

The minor quantities of materials involved and the ability of the soil to neutralize acids result in low potential for further contamination in spite of the toxicity of some of the materials released. Rankings are based on lack of specific knowledge regarding quantities of chemicals released. Sampling and characterization will be required to determine the extent of localized damage, if any, to these areas.

5. Asbestos (Unit 15)

Although samples of certain soils show asbestos to be present, steps presently being taken to remove or seal the building materials containing asbestos to prevent further release should minimize the environmental contamination potential. A score of 12 was given to this release.

6. Contaminated Soil Storage (Units 14 and 30)

Soil contaminated with low levels of radioactivity and possibly minor quantities of chemicals is stored within the ICPP boundary. Characterization will be required to determine if chemicals are present. This storage does not appear to pose significant environmental risks.

7. The WCF French Drain (Unit 16)

The French drain south of the WCF was used for disposal of chemicals. Quantities and compositions are not totally known. Contamination is expected to be localized with low potential for extensive environmental releases beyond the immediate vicinity. This area is currently being characterized.

8. Transport Line Leaks (Units 17, 22, 31, and 35)

Because of the small quantities of waste released, environmental damage is expected to be localized and minimal. Releases are underground where further migration will be minimal. The major radioactivity release (Unit 17) has been extensively mapped to assure that its location is known.

9. Kerosene Release (Unit 18)

The quantity of material released and the small area involved, minimize and localize this release. Major environmental damage is not a concern.

10. Grease Pits (Units 20 and 21)

Grease pits at the ICPP, especially the one by CPP-608, appear to have been used for the discharge of unknown quantities and

types of chemicals. Characterization will be required to determine if any environmental damage has occurred to Unit 20. No major environmental damage is expected because of the distance to the aquifer and minor amounts of water discharged. Characterization will not be conducted for Unit 21 because it is under CPP-651.

11. HF Pit and Dry Well and Lime Pit by CPP-601 Berm (Unit 24, 25)

    Hydrofluoric acid previously drained to two lime pits near CPP-640. Following neutralization, the solution from one pit flowed to a dry well. The volumes and extent of this contamination are not known but will be determined. Potential for further environmental damage is localized to the vicinity of the pits and dry well.

12. Gravel Pits (Unit 28)

    The two gravel pits in the northeast sector of the ICPP received various chemical and radioactive wastes that are largely unrecorded. Further identification will be required to determine what was discharged. Any environmental damage will be localized to the vicinity of the pits.

13. CPP-621 Acid Storage (Unit 29)

    Neutralization by the soil and small release volumes minimize any further potential environmental damage. This area is scheduled for upgrading to prevent any releases of tank contents and will be characterized at that time.

14. Fuel Storage Area (CPP-603) Releases (Units 32, 33, 34, 37, and 38)

    Because these releases consisted of low levels of radioactivity, many of which were at least partially cleaned up, no significant environmental damage is anticipated. Characterizations will be conducted.

15. Sewage Drain Tiles and Outfall Line (Unit 36)

The levels of contamination involved make this a low priority area for further environmental concern. Any activity amounts were extremely low. A characterization will be conducted.

7.0 RECOMMENDATIONS

Recommendations to further assess the potential for environmental contamination and to take corrective action as necessary at the ICPP are presented in this section. Units with a known or expected potential for environmental contamination will require further investigation during Phase II of the CERCLA program and may require further corrective action, based on the results of the characterization studies.

Those units which have received only minor quantities of contamination will require characterization. Other sites of known contamination, but of unknown extent, will require characterization by exploratory drilling to depths and at distances required to determine the extent of the contamination. Soil samples will be obtained and analyzed for constituents such as pH, PCBs, sulfate, fluoride, nitrates, boron, radioactivity, and EPA EP toxic materials. Routine soil sampling surveys, similar to those done in the past, also are planned. High-level radioactive contaminated sites have been mapped, and wells and monitoring holes have been dug to determine the extent of these areas. Existing data will be evaluated and the need for more monitoring wells will be considered. Radiation readings taken from monitoring wells (through holes drilled to bedrock through which radiation instruments can be lowered) will be compared with existing data. Routine monitoring for surface radioactivity will continue.

The use of the injection well, currently used only during emergency conditions, should be discontinued. Samples down-gradient from the well will continue to be analyzed to determine what migration, if any, is occurring. Sample well locations should be reviewed to determine if they are adequate in terms of depth and location.

The specific recommendation for each ranked waste site is shown in Table 7.1. Areas which were not ranked have been cleaned and no further action is expected.

TABLE 7.1

RECOMMENDATIONS FOR ICPP POTENTIAL WASTE UNITS

Ranking	Locations	Recommendation
1	ICPP Injection Well	Discontinue use. Continue with closure plan presently being prepared. Further action when closure plan completed.
2	Tank Farm Contaminated Soil (9/75)	Review existing data. Monitor existing wells. Expand characterization studies to clearly identify boundaries of contamination (where existing data are inadequate). Reevaluate studies regarding leaving in place. Decide if removal is required.
3, 4, 5	PCB Transformer Yards (CPP 705 and 731) and Staging Area (West of CPP-660)	Complete closure plans.
6	Paint and Paint Solvent Storage Area (South of CPP-697)	Characterize and prepare remedial action plan.
7	Mercury-Contaminated Soil (T-15)	Characterize by further soil sampling and analysis. Closure plan being prepared. Remove material as required.
8	Pilot Plant Tank Release (CPP-637 Courtyard)	Chemical sampling of courtyard area to determine if all waste cleaned up originally. Remove any hazardous material.
9, 10, 11, 13	Contaminated Soil Incidents in Tank Farm Area	Review existing data. Monitor existing wells. Expand characterization studies to clearly identify boundaries of contamination (where existing data are inadequate). Determine if migration is occurring. Reevaluate studies regarding leaving in place. Decide then if removal is required.

TABLE 7.1 (contd.)

Ranking	Locations	Recommendation
14	Contaminated Soil Storage Burial (northeast Corner of the ICPP)	Continued monitoring of area. Characterize soil.
15	Asbestos	Continue sampling. Clean up areas as identified.
16	WCF French Drain (South of CPP-633)	Extensive characterization (presently in progress) required. Cleanup if necessary.
17	Leak in Line From WCF to WL-102	Continue routine monitoring. Determine if extent of release requires further action.
18	Kerosene Release	Characterize by using soil sampling. Prepare closure plan.
19	CPP-637 Storage Area	Sample around drum storage area. Remove any hazardous material detected.
20, 21	Grease Pits (By CPP-651 and CPP-608)	Pit by CPP-651 covered by building. No further action. Pit by CPP-608 will require chemical sampling and a closure plan with possible further action based on closure plan.
22	PEW Evaporator Overheads	Minor characterization for acid and toxic metals.
23	Drum Storage Area by CPP-660	Complete closure plan.
24	HF Acid Storage Tank (YDB-105), Pit and Dry Well	Complete closure plan. Clean up area. Remove tank; remove pit and dry well if required.
25	Lime Pit by Base of CPP-601 Berm	Complete closure plan. Clean up area if necessary. Remove pit and French drain if required.
26	CPP-637 Drainage Ditch (West of CPP-637)	Closure plan being prepared. Minor chemical sampling; cleanup if contamination found.
27	HNO_3 Leakage (WL-103 to CPP-734)	Minor chemical sampling; cleanup if contamination found.

TABLE 7.1 (contd.)

Ranking	Locations	Recommendation
28	Gravel Pits	Sample area for radioactivity and chemicals. Characterize; prepare closure plan Cleanup depends on sampling results.
29	CPP-621 Chemical Storage Area	Complete closure plan. Install containment vaults to retain any spills occurring in the future (design completed - project pending).
30	Peach Bottom Contaminated Soil Storage Area	Continued monitoring of area. Remove small quantities of soil to RWMC if contaminated.
31	CPP-603, -604 Transport Line Leak - 3/78	Characterize and continue monitoring if necessary. Remove contaminated soil.
32	CPP-603 Lay-down Area	Characterize by soil sampling and remove soil if necessary.
33	CPP-603 Vault and Dry Wells	Characterize and decontaminate site by removal of material to Radioactive Waste Management Complex as required.
34	Trench near CPP-603 Storage Basin	Characterization work to determine if any radioactive contamination exists in area. If contamination is found, remove to RWMC.
35	WM-181 Transfer Line to Evaporator - 1/76	Characterize for chemicals and radioactivity.
36	Sewage Drain Tiles and Outfall Line	Characterization to see if contamination is present.
37	Soil Contamination (NE Corner of South Basin)	Characterization to determine if any radioactive contamination exists. If contamination is found, remove soil to RWMC.
38	Basin Filter System Line Failure (CPP-603)	Characterization to determine if any radioactive contamination exists. If contaminated soil is found, remove to RWMC.

8.0 REFERENCES

1. Public Law No. 96-510(1980), 42 USC Section 9601, et.seq, "Comprehensive Environmental Response, Compensation, and Liability Act of 1980".

2. U.S. Department of Energy, Order DOE 5480.14, "Comprehensive Environmental Response, Compensation, and Liability Act Program," April 26, 1985.

3. K. A. Hawlay and B. A. Napier, "A Ranking System for Sites with Mixed Radioactive and Hazardous Wastes," (comment draft), February 1985.

4. Bingham, G. E. and E. Gerstenberger, (editors), "Fuel Processing Restoration Project Justification," ENI-220 (March 1983).

5. Wilson, Jones, R., "ICPP Failure/Event Database (Users Guide)," updated by Tony O. Pham (June 1985).

6. 40 CFR 300, Appendix A, "Uncontrolled Hazardous Waste Site Ranking Systems," A Users Manual.

7. D. L. Litteer, "Radioactive Waste Management Information 1984 Summary and Record-to-Data," DOE-ID-10054(84) (June 1984).

8. B. E. Paige (ed.), "Buried Waste Line Register for NRTS Part IV, CPP," ACI-110, (June 1972).